Tanta University **4th year, Computers & Control Dept.**
Faculty of Engineering **Microcontroller course**

Sheet 3

(1) Find the number of times the following loop is performed:

```
        MOV R3, #150
LLL:    MOV R4, #180
HHH:    DJNZ R4, HHH
        DJNZ R3, LLL
```

(2) Show the code to execute an action 1000 times?

(3) Write an assembly program to add the values in registers R2, R3, and R5. Complement the result and then store the lower byte in accumulator and the higher byte in R6?

(4) Write an assembly program to add the contents of register R3 to the accumulator 300 times and store the result in memory location LOC?

(5) What would happen if the program did not initialize the SP? Could you overwrite code? Could you overwrite data?

(6) Let us assume that you have initially set the SP to the end of the RAM. If you push the contents of R0 on the stack after it has been initialized, then at which address is the data located and to which address does the SP point?

(7) Show the stack for the following code:

```
000B    120300              LCALL DELAY
000E    80F0                SJMP   BACK
……
0300                        ORG 300H
0300            DELAY:
0300    7DFF                MOV R5,#0FFH
```

```
0302    DDFE      AGAIN:   DJNZ R5, AGAIN
0304    22                 RET
```

(8) Explain what will happen if the following code is executed showing the stack. Calculate the time taken by the DELAY subroutine:

```
0000                       ORG 0
0000    7466      AAA:     MOV A,#66H
0002    F590               MOV P1, A
0004    7C77               MOV R4, #77H
0006    7D88               MOV R5, #88H
0008    120300             LCALL  DELAY
000B    7499               MOV A,#99H
000D    F590               MOV P1, A
000F    120300             LCALL  DELAY
0012    80EC               SJMP AAA
 ……
0300                       ORG 300
0300    C004      DELAY:   PUSH 4
0302    C005               PUSH 5
0304    7CFF               MOV R4, # FFH
0306    7DFF      MMM:     MOV R5, #FFH
0308    DDFE      GGG:     DJNZ R5, GGG
030A    DCFA               DJNZ R4, MMM
030C    D005               POP 5
030E    D004               POP 4
0310    22                 RET
0311                       END
```

(9) For 8051 system of 11.0592 MHz, find how long it takes to execute the following code:

```
            MOV R3, #200
NEXT:       MOV R4, # FFH
AGAIN:      DJNZ R3, AGAIN
            DJNZ R4, NEXT
```